CASWELL FILE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: July 31, 1979

SUBJECT: EPA File Symbol: 1812-EUL GRIFFIN LINURON 4L FLOWABLE WEED KILLER
Caswell #528

FROM: B.T. Backus

TO: IRB/TSS
Mr. Robert Taylor
Product Manager 25

Applicant: GRIFFIN CORPORATION
P.O. Box 1847
Valdosta, GA 31601

Active Ingredient:
Linuron.....40.6%
Inert Ingredients:.....59.4%

Recommendations:

1. The submitted Acute Oral LD50, Acute Dermal LD50, Dermal and Eye Irritation studies are adequate and acceptable for registration purposes.

2. The Acute Inhalation LC50 study, as reported, is not acceptable for registration purposes. Although subjects were exposed to a nominal concentration of 5.1 mg/liter, the measured concentration is given as 0.043 ± 0.013 mg/liter. Because of this considerable difference (measured concentration is less than 1% of the nominal) this study cannot be used to assign the proposed product to a toxicity category for inhalation exposure.

   The study must be repeated or it must be shown that the test subjects were actually exposed to a concentration which was comparable with the nominal value if the applicant is submitting all acute toxicological data for this formulation.

3. IRB/TSS recommends against issuance of a conditional registration for this product until the question of concentration in the Acute Inhalation LC50 study is resolved, or unless the applicant wishes to use the "Cite-all" method of support.

Labeling:

1. The labeling reviewed appears to be a technical brochure rather than an actual label which would be affixed to the product container.

2. Because of the unacceptability of the Acute Inhalation LC50 study in support of this application, we cannot prescribe a complete precautionary statement at this time.

3. It would be necessary for the precautionary statement to appear under the heading PRECAUTIONARY STATEMENTS and the subheading HAZARDS TO HUMANS AND DOMESTIC ANIMALS.

4. There should be an ENVIRONMENTAL HAZARDS statement (under that heading). The appropriate statement would be: "Keep out of lakes, ponds or streams. Do not contaminate water by cleaning of equipment of disposal of wastes."

5. It appears, since the product is a liquid, that the proposed statement "Avoid breathing dust or spray." should be revised to "Avoid breathing spray."

6. The statement: "It is a violation of Federal law to use this product in a manner inconsistent with its labeling." should appear immediately under the heading DIRECTIONS FOR USE.

7. There should be an appropriate STORAGE AND DISPOSAL statement (under that heading).

Review:

All studies were conducted by Cannon Laboratories, Inc. P.O. Box 3627, Reading, PA 19605 using a formulation identified as "43% Linuron." All studies were submitted to Griffin Corporation.

1. Acute Oral LD50 of 43% Linuron in Sprague-Dawley Rats; dated March 15, 1979; Lab. no. 9E-4456; in EPA Acc. 238145.

   Procedure: Groups of 5M, 5F rats received 2000, 3000, 4000, 5000 and 7000 mg/kg of the product in a single administration. Animals were observed 14 days, then sacrificed and necropsied.

   Results: At 2000 mg/kg, no mortalities; 3000 mg/kg, 0M, 1F died; at 4000 mg/kg 4/5M, 1/5F died; 5000 mg/kg 4/5M, 3/5F died; at 7000 mg/kg 3M, 4F died. Deaths occurred on days 1-7; autopsies of dead animals showed distended stomachs and intestines filled with yellow and/or dark red gelatinous material. Symptomology included ataxia, dried red material around eyes, decreased activity, piloerection, ptosis, respiration, depression and sedation at all dose levels, while chromodacryorrhea, comatose condition, reddish nasal discharge were dependent on dose level. Females at all levels showed, on the average, little or no weight gains. Surviving males gained weight. Oral LD50 (M rat) = 3600 mg/kg (2182-5940 mg/kg) and Oral LD50 (F rat) = 5300 mg/kg (4015-6996 mg/kg).

   Study Classification: Core Minimum Data (individual body weight data not given).

   Product Classification: Tox. Cat. III:CAUTION

2. Acute Dermal LD50 Study of 43% Linuron on New Zealand Albino Rabbits; dated March 16, 1979; Lab. no. 9E-4457; in EPA Acc. 238145.

   Procedure: 5M, 5F rabbits, 2.48-3.83 kgs, received 24 hr exposure on abraded skin to a dosage level of 2 g/kg. Material was under gauze, with each animal's trunk wrapped with"impervious" (presumably impermeable) elastic tape. Animals were observed 14 days, with sacrifice and necropsy.

   Results: No deaths. Erythema at 24 hrs in 8/10; all skin sites normal at 6 days. Subjects gained weight; necropsy results were unremarkable. Dermal LD50 above 2 g/kg.

   Study Classification: Core Minimum Data (body weight data indicates some animals were not particularly young).

   Product Classification: Tox. Cat. III:CAUTION

3. Acute Inhalation Toxicity Study of 43% Linuron (rats); March 13, 1979; Lab. no. 9E-4458; in EPA Acc. 238145.

   Procedure: 5M, 5F Sprague-Dawley rats, 206-300 gms, were exposed to a nominal concentration of 5.1 mg/liter, and, as reported, an actual atmospheric concentration of 0.043 $\pm$ 0.013 mg/liter for a period of 4 hrs, with a subsequent 14-day observation period, sacrifice, and necropsy.

   Results: 1M died on day 5; autopsy showed it had gelatinous material in the intestines. Symptomology of exposed animals included short rapid respiration during and up to 3 days after exposure, nasal discharge with dried blood around nares. Nasal discharges recurred in 5 subjects during 14-day observation period. Weight fluctuations occurred during 1st week after exposure; 7/9 survivors were gaining weight at end of study. Survivors had normal gross pathology.

   Study Classification: Normally the measured concentration of the test substance should be a reasonably high percentage (60-90%) of the nominal concentration. In this case, however, the reported measured concentration is less than 1% of the nominal concentration. If the test subjects were actually exposed to only 0.043 $\pm$ 0.013 mg/liter for a 4-hr period, then they were exposed to the equivalent of less than 0.2 mg/liter for a 1 hr period. This is the lower limit of toxicity category II. Core Supplementary Data.

4. Primary Eye Irritation Study of 43% Linuron on New Zealand Albino Rabbits; dated Feb. 6, 1979; Lab. no. 9E-4148; in EPA Acc. 237806.

   Procedure: 0.1 gm was instilled in the right eye of each of 9 rabbits;

6 had unwashed eyes, 3 were washed for one minute with lukewarm water beginning 20 seconds after instillation, with Draize scoring at 24, 48, 72 hrs and 4 and 7 days.

Results: No corneal opacity; 6/6 unwashed, 1/3 washed eyes showed conjunctival redness at 24 hrs; all eyes clear by 3 days.

Study Classification: Core Guideline Data

Product Classification: Tox. Cat. III:CAUTION

5. Primary Dermal Irritation Study of 43% Linuron on Abraded and Non-abraded Skin of New Zealand Albino Rabbits; Lab. no. 9E-4149; dated Feb. 6, 1979.

Procedure: 0.5 ml was applied to each of 4 skin sites (2 intact, 2 abraded) on each of 6 rabbits (1.70-2.59 kg). Test sites were occluded for 24 hrs, and scored (Draize) at 24 and 72 hrs for erythema and edema.

Results: No signs of dermal irritation were observed at 24 and 72 hrs.

Study Classification: Core Guideline Data

Product Classification: Tox. Cat. IV: CAUTION

Byron T. Backus 7-31-79

Byron T. Backus
IRB/TSS

GRIFFIN
LINURON 4L
FLOWABLE WEED KILLER

ACTIVE INGREDIENT:

Linuron [3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea]	40.6%
INERT INGREDIENTS	59.4%

U.S. Pats. 2,950,534 & 3,079,244 EPA Reg. No.

THIS PRODUCT CONTAINS 4 POUNDS LINURON PER GALLON

Keep out of reach of children.

CAUTION! HARMFUL IF SWALLOWED. MAY IRRITATE EYES, NOSE, THROAT, AND SKIN. • Avoid breathing dust or spray. • Avoid contact with skin, eyes, and clothing.

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IMPORTANT

Injury to or loss of desirable trees or other plants may result from failure to observe the following:

Do not apply (except as recommended for crop use), or drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. Do not use on home plantings of trees, shrubs or herbaceous plants, nor on lawns, walks, driveways, tennis courts, or similar areas. Prevent drift of dry powder or spray to desirable plants. Do not contaminate any body of water. Keep from contact with fertilizers, insecticides, fungicides, and seeds.

Thoroughly clean all traces of GRIFFIN LINURON from application equipment immediately after use. Flush tank, pump, hoses, and boom with several changes of water after removing nozzle tips and screens (clean these parts separately). Do not contaminate water by cleaning of equipment or disposal of wastes. Do not re-use containers. Bury when empty.

GENERAL INFORMATION

GRIFFIN LINURON Weed killer is a FLOWABLE HERBICIDE to be mixed in water and applied as a spray for selective control of weeds in certain crops and for non-selective weed control on non-cropland areas. It is non-corrosive to equipment, non-flammable and non-volatile.

GRIFFIN LINURON may be applied to soil prior to emergence of weeds to control susceptible weed seedlings for an extended period of time; the degree of control and duration of effect will vary with the amount of chemical applied, soil texture, rainfall and other conditions. Soils high in clay or organic matter require higher dosages than soil low in clay or organic matter to obtain equivalent herbicide performance. Moisture is required to activate the chemical; best results occur if rainfall (or irrigation) occurs within 2 weeks of application. In the Columbia River Basin, use GRIFFIN LINURON only if crop is sprinkler irrigated.

GRIFFIN LINURON may also be used to control emerged weeds. Results vary with rate applied and environmental conditions; best results are obtained on succulent weeds growing under conditions of high humidity and temperatures of 70°F or higher. Addition of a surfactant to the spray (where recommended) increases contact effects of GRIFFIN LINURON.

Since the effect of GRIFFIN LINURON varies with soils, uniformity of application, and environmental conditions, it is suggested that growers limit their first use to small areas. Observe all cautions and limitations on labeling of all products used in mixtures.

NOTICE OF WARRANTY

GRIFFIN warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with directions under normal use conditions. It is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of GRIFFIN. In no case shall GRIFFIN be liable for consequential, special or indirect damages resulting from the use or handling of this product. All such risks shall be assumed by the Buyer. GRIFFIN MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.

DIRECTIONS

GRIFFIN LINURON Weed Killer should be used only in accordance with recommendations on this label.

SELECTIVE USE IN CROPS

PRE-EMERGENCE USE (Germinating Weeds): GRIFFIN LINURON at recommended rates, controls barnyardgrass (watergrass), canarygrass, carpetweed, chickweed, crabgrass, fall panicum, Florida pusley, foxtail (including giant foxtail), galinsoga, goosegrass, lambsquarters, mustard, nettleleaf goosefoot, pigweed, purslane, ragweed, smartweed and wild radish. Treatment usually provides partial control of annual morningglory, cocklebur, prickly sida (teaweed), sicklepod and velvetleaf (buttonweed); it will not control established perennials such as Bermudagrass, Canada thistle, field bindweed, Johnsongrass and purple nutsedge. The lower dosages rates are effective on the lighter soils and the higher rates on heavier soils and on the more resistant seedling weeds. Sufficient moisture (½" to 1" on moist soils; 1" to 2" on dry soils) in the form of rainfall

or sprinkler irrigation is necessary after treatment to carry the chemical into the root zone of germinating seeds; best results are obtained when this occurs within two weeks after application.

A good seed bed must be prepared before application of GRIFFIN LINURON as crop injury may result if application is made to ground which is cloddy or compacted resulting in improperly planted seed. Plant seed to depth specified. Surface of the soil should not be cultivated or disturbed after application of LINURON and before emergence of the crop as weed control may be reduced and crop injury may result. However, if moisture is insufficient to activate the herbicide, a shallow cultivation (rotary hoe preferred) should be made after emergence of row crops while weeds are small enough to be controlled by mechanical means.

POST-EMERGENCE USE (Emerged Seedling Weeds): GRIFFIN LINURON at recommended rates, controls Amsinckia, annual morningglory, annual ryegrass, barnyardgrass (watergrass), canarygrass, carpetweed, cocklebur, crabgrass, dog fennel, fall panicum, Florida pusley, foxtail (including giant foxtail), goosegrass, groundsel, knawel, lambsquarters, mustard, nettleleaf goosefoot, pigweed, prickly sida (teaweed), purslane, ragweed, rattail fescue, sesbania, sicklepod, smartweed, Texas panicum, velvetleaf (buttonweed) and wild buckwheat. Best results are obtained under conditions of high humidity and temperatures over 70°F. Control of emerged weeds under drought stress is usually impractical.

EQUIPMENT — SPRAY VOLUMES AND PRESSURES: Use a tractor-mounted fixed-boom power sprayer properly calibrated to a constant speed and rate of delivery. Openings in screens should be equal to or larger than 50 mesh. Continuous agitation in the spray tank is required to keep the material in suspension. Agitate by mechanical or hydraulic means; if by-pass or return line is used, it should terminate at bottom of tank to minimize foaming. Avoid overlapping, and shut off spray booms while starting, turning, slowing or stopping, or injury to the crop may result.

For pre-emergence application, use 25 to 40 gals. per acre and spray pressure of 30 to 40 psi. For post-emergence application, use sufficient volume (min. 25 gals. per acre) for thorough coverage of weed foliage; use spray pressure of 20 to 25 psi to keep spray drift to a minimum.

Aerial: GRIFFIN LINURON may be applied by aircraft to carrots, potatoes, and wheat in 5 to 10 gals. of water per acre and to soybeans (pre-emergence only) in 2 to 10 gals. per acre. Avoid overlapping of spray swath and avoid application under conditions where excessive drift may occur. Where aerial application is made on bedded plantings, apply parallel to rows.

SPRAY PREPARATION: Mix proper amount of GRIFFIN LINURON into necessary volume of water; for pre-emergence applications, non-pressure nitrogen solution may be substituted for all or part of the water. Where use of Surfactant ___ is recommended, dilute with 10 parts of water and add as last ingredient to nearly full tank.

USE RATES: All dosages of GRIFFIN LINURON (and tank mixtures) are expressed as broadcast rates; for band treatment, use proportionately less. For example, use 1/3 of the broadcast rate when treating a 14" band where row spacing is 42". Where a range of dosages is given, use the lower rate on lighter soils (low in clay or organic matter) and the higher rate on heavier soils (high in clay or organic matter); for post-emergence application, use the lower rate on smaller weeds and the higher rate on larger weeds.

SOIL LIMITATIONS: Unless otherwise directed, do not use on sand, loamy sand, gravelly soils or exposed subsoils nor on soils containing less than 1% organic matter as crop injury may result.

REPLANTING: If initial seedling fails to produce a stand, the same crop may be replanted in soil treated pre-emergence with GRIFFIN LINURON (or with recommended tank mixtures). Thoroughly rework soil before replanting; do not re-treat field with a second application as injury to the crop may result. Unless otherwise directed, do not replant treated areas to any other crop within 4 months after last application as injury to subsequent crops may result.

CARROTS — Pre-emergence Application — Michigan and Wisconsin: Make a single application of 1 to 3 pts per acre after planting but before carrots emerge; plant seed at least ½" deep. Use the lower rate on lighter soils (low in clay or organic matter) and the higher rate on heavier soils (high in clay or organic matter). Subsequent post-emergence application may be made provided the total does not exceed 4 pts per acre per season.

Post-emergence Application — U.S.: Apply 1½ to 3 pts per acre as a non-directed spray after carrots are at least 3" tall. Apply before annual grasses exceed 2" in height and before broadleaf weeds exceed 6" in height. Repeat application may be made but do not exceed 4 pts per acre; do not exceed 40 psi spray nozzle pressure as crop injury may result.

GRIFFIN LINURON may be applied following an application of Stoddard solvent provided treatments are at least one day apart. Stoddard solvent may be applied following an application of GRIFFIN LINURON provided treatments are at least 2 weeks apart. Shorter time intervals between applications may result in injury to the crop. Do not apply GRIFFIN LINURON as a tank mixture with Stoddard solvent, surfactants, nitrogen solution, other pesticides, nor when temperatures exceeds 85° F as crop injury may result.

Note: Because carrot varieties vary in their resistance, determine tolerance to GRIFFIN LINURON prior to adoption as a field practice to prevent possible crop injury; do not treat susceptible varieties which show an initial burning of foliage following post-emergence treatment with ___.

CELERY — Post-transplant Application: Make a single application of 1½ to 3 pts. per acre. Apply as a non-directed spray after celery is transplanted and established, but before celery is 8" tall. Apply before annual grasses exceed 2" in height and before broadleaf weeds exceed 6" in height. In the Northeast, use only on celery grown on muck soils.

Do not exceed 40 psi spray nozzle pressure, and do not apply when temperature exceeds 85°F. nor as a tank mixture with surfactants, nitrogen solution, or other pesticides as injury to the crop may result. Do not replant to crops other than celery or carrots within 4 months after application as injury to subsequent crops may result.

CORN (FIELD) — East of Rocky Mountains — Pre-emergence Application: Select one of the following herbicide treatments for application as a tank mixture. Make a single application after planting but before crop emerges. Plant seed at least 1¾" deep on flat or raised seedbeds only or injury to the crop may result. Do not spray over top of emerged corn.

GRIFFIN LINURON + "Lasso"® (Dilute "Lasso" with 2 parts of water and add as last ingredient to spray tank.)

	Product Per Acre	
Soil Texture	Low Organic Matter (1% to 3%) GRIFFIN LINURON (PTS) + "Lasso" (Qts.)	Moderate Organic Matter (3% to 6%) GRIFFIN LINURON (PTS) + "Lasso" (Qts.)
Sandy loam	2/3 to 1 1/4 + 3/4 to 1	1 1/4 to 2 + 1 to 1 1/2
Silt loam	1 to 1 2/3 + 1 to 1 1/2	1 2/3 to 2 1/2 + 1 1/2 to 2
Clay loam	1 1/4 to 2 + 1 1/2 to 2	2 to 3 + 2 to 2 1/2

Replanting: Corn or soybeans may be replanted within 4 months; after 4 months, any crop may be planted.

GRIFFIN LINURON + "Ramrod"*

	Product Per Acre	
Soil Texture	Low Organic Matter (1 to 3%) GRIFFIN LINURON (PTS) + "Ramrod" 65 (Lbs.)	Moderate Organic Matter (3 to 6%) GRIFFIN LINURON (PTS) + "Ramrod" 65 (Lbs.)
Sandy loam	2/3 to 1 1/3 + 1 to 2	1 1/3 to 2 + 2 to 3
Silt loam	1 to 1 2/3 + 1 1/2 to 2 1/2	1 2/3 to 2 1/2 + 2 1/2 to 4
Clay loam	1 1/4 to 2 + 2 to 3	2 to 3 + 3 to 4 3/4

Replanting: Corn may be replanted within 4 months; after 4 months, any crop may be planted.

GRIFFIN LINURON + Atrazine

	Product Per Acre	
Soil Texture	Low Organic Matter (1 to 2%) GRIFFIN LINURON (PTS) + atrazine 80% (Lbs.)	Moderate Organic Matter (2 to 5%) GRIFFIN LINURON (PTS.) + atrazine 80% (Lbs.)
Sandy loam	2/3 to 1 + 1/2 to 2/3	1 to 2 + 2/3 to 1 1/4
Silt loam	1 to 1 1/2 + 2/3 to 1	1 1/2 to 2 1/2 + 1 to 1 1/2
Clay loam	1 1/3 to 1 2/3 + 3/4 to 1	1 2/3 to 3 + 1 to 2

Replanting: Corn may be replanted within 6 months. After 6 months, any crop may be planted except do not follow treated corn with sugar beets, tobacco, or vegetables in rotation.

CORN (FIELD AND SWEET) — Directed Post-emergence Application: Make a single application as a directed spray after corn is at least 15" high (measured to the highest leaf surface on free standing plants). Do not spray over top of corn. Apply only when there is sufficient differential between height of corn and weeds so that the directed spray thoroughly covers all weed foliage without contact of upper leaves or whorl of corn by spray or drift, as such contact may cause crop injury. Early cultivation (rotary hoe or other suitable equipment) will aid in achieving proper differential between height of corn and weeds.

Use 1¼ to 3 pts per acre; add 1 pt. Surfactant for each 25 gals. spray mixture. For field corn, non-pressure nitrogen solution may be substituted for all or part of the water. Use the lower rate on lighter soils (low in clay or organic matter) and when weeds do not exceed 2" in height; use the higher rate on heavier soils (high in clay or organic matter) for weeds up to 5" in height.

COTTON — East of Rocky Mountains — Directed Post-emergence Application: Apply as a directed spray; adjust nozzles to minimize contact of cotton leaves with spray or drift or crop injury may result. Do not spray over top of cotton.

Apply 1 to 1½ pts per acre when cotton is at least 15" tall and emerged weeds do not exceed 2" in height; add 1 pt. Surfactant for each 25 gals. spray mixture. If needed, a second application at same rate may be made one week or later after initial treatment. Alternatively, after cotton is 20" tall, make a single application of 2 to 3 pts per acre following last cultivation; if emerged weeds are present, add Surfactant as directed above.

Note: Do not use on Pima varieties of cotton. Do not graze treated fields or feed forage from treated areas to livestock. Do not feed gin trash to livestock.

PARSNIPS — Pre-emergence Application: Make a single application of 1½ to 3 pts. per acre. Apply after planting but before crop emerges. Plant seed at least ½" deep.

POTATOES — Pre-emergence Application: Make a single application as a broadcast spray after planting but before crop emerges. Plant seed at least 2" deep. Do not spray over top of emerged potatoes. If beds are to be "dragged" and/or "hilled", apply after the final "dragging" or "hilling" operation. Apply before grasses are 2" tall and before broadleaf weeds are 6" tall, preferably just before or when weed seedlings emerge. If emerged weeds are present, add 1 pt. Surfactant for each 25 gals. spray mixture. In irrigated areas, best results are obtained when application is made to moist soil, followed within 2 weeks by 1" to 2" of sprinkler irrigation (or rainfall). On powder dry soils, irrigate prior to herbicide application and follow with sprinkler irrigation to activate the herbicide.

East of Rocky Mountains: Apply 1½ to 2½ pts per acre on the lighter soils (sandy loams, silt loams; 1 to 2% organic matter) and 2½ to 4 pts per acre on heavier soils (silts, clay loams; 2 to 5% organic matter); on soils over 5% organic matter, use 4 pts. per acre and apply to emerged weeds (before potatoes emerge).

Wisconsin — Central Sands Area: Apply 1 pt. per acre on sands and 2 pts per acre on loamy sands.

SORGHUM — Pre-emergence Application: Select one of the following herbicide treatmens for application as a tank mixture. Make a single application after planting but before crop emerges. Plant seed at least 1" deep on flat or raised seedbeds only or injury to the crop may result. Do not spray over top of emerged sorghum.

GRIFFIN LINURON + propazine (Southwest)

	Product Per Acre	
Soil Texture	Low Organic Matter (1 to 2%) GRIFFIN LINURON (PTS) + propazine 80% (Lbs.)	Moderate Organic Matter (2 to 4%) GRIFFIN LINURON (PTS) + propazine 80% (Lbs.)
Sandy loam	5/8 to 1 + 3/8 to 5/8	1 to 1-1/2 + 5/8 to 1
Silt loam, clay loam	1 to 1-1/2 + 5/8 to 1	1 to 2 + 5/8 to 1-1/4

Replanting: Do not follow treated sorghum with any fall crop, nor with sugar beets, tobacco, vegetables or potatoes in rotation. Prior to replanting, thorough seedbed prepara-

*Registered trademarks of Monsanto Company; "Lasso" contains 4 lbs. alachlor

+ "Ramrod" (Great Plains)

Soil Texture	Product Per Acre: Low Organic Matter (1 to 3%) LINURON (pts.) + "Ramrod" 65 (Lbs.)	Product Per Acre: Moderate Organic Matter (3 to 6%) LINURON (pts.) + "Ramrod" 65 (Lbs.)
Sandy loam	2/3 to 1 1/3 + 1 to 2	1 1/3 to 2 + 2 to 3
Silt loam	1 to 1 2/3 + 1 1/2 to 2 1/2	1 2/3 to 2 1/2 + 2 1/2 to 4
Clay loam	1 1/4 to 2 + 2 to 3	2 to 3 + 3 to 4 3/4

eplanting: Sorghum or field corn may be replanted within months; after 4 months, any crop may be planted.

ote: Do not graze or feed sorghum forage or silage from eated fields to dairy animals.

irected Post-emergence Application: Make a single pplication of LINURON as a directed spray; add 1 pt. ctant for each 25 gals. spray mixture. If sprayer is quipped with skids, shoes or shields, apply 1 pt. per acre hen sorghum is 12" tall (free standing plants) and weeds re up to 2" in height; use 1 to 2 pts. per acre when sorghum 15" tall and weeds are 2" to 4" in height. If boom-drops re used, apply 1 to 2 pts. per acre when sorghum is at least 3" tall and weeds are 2" to 4" in height. Apply only when here is sufficient differential between height of sorghum nd weeds so that the directed spray thoroughly covers all eed foliage without contact of upper leaves or whorl of orghum by spray or drift as such contact may cause crop injury.

ote: Do not graze or feed plants to livestock within 3 onths after post-emergence application.

OYBEANS — Pre-emergence Application: Select one of e following herbicide treatments and make a single pplication after planting but before crop emerges. , alone or as a tank mixture with "Lasso", may be d by aircraft (2 to 10 gals. water per acre). Plant seed least 1¾" deep on flat or raised seedbeds only or injury to e crop may result. Do not spray over top of emerged ybeans.

— If weeds have emerged, add 1 pt. Surfactant each 25 gals. spray mixture.

Soil Texture	LINURON Lbs. Per Acre: Low Organic Matter (1/2 to 2%)	LINURON Lbs. Per Acre: Moderate Organic Matter (2 to 5%)
ndy loam	1 to 1 2/3	1 2/3 to 3
lt loam	1 1/4 to 2 1/3	2 1/3 to 4
ay loam	1 1/3 to 2 2/3	2 2/3 to 5 (Over 5% organic matter, use 6 pts)

planting: Soybeans or field corn may be replanted within months; after 4 months, any crop may be planted.

Following "Treflan"** Preplant — Where "Treflan" s been used as a preplant incorporated treatment cording to directions on "Treflan" label), apply a separate operation using ½ the rate recommended ove for LINURON alone. For rotation crops, follow instruc- s on "Treflan" label.

gistered trademark of Elanco Products Company.

LINURON + "Amiben"

Soil Texture	Product Per Acre: Low Organic Matter (½ to 3%) LINURON (pts.) + "Amiben" (Qts.)	Product Per Acre: Moderate Organic Matter (3 to 5%) LINURON (pts.) + "Amiben" (Qts.)
Sandy loam	2/3 to 1½ + 3	1½ to 2 + 3
Silt loam	1 to 1-2/3 + 3	1-2/3 to 2 ½ + 4
Clay loam	1¾ to 2 + 4	2 to 3 + 5

Replanting: Soybeans or field corn may be replanted within 4 months; after 4 months, any crop may be planted.

LINURON + "Lasso" — East of Rocky Mountains (Dilute "Lasso" with 2 parts of water and add as last ingredient to spray tank.)

Soil Texture	Product Per Acre: Low Organic Matter (1/2 to 3%) LINURON (pts.) + "Lasso" (Qts.)	Product Per Acre: Moderate Organic Matter (3 to 6%) LINURON (pts.) + "Lasso" (Qts.)
Sandy loam	2/3 to 1 1/4 + 3/4 to 1	1 1/4 to 2 + 1 to 1 1/2
Silt loam	1 to 1 2/3 + 1 to 1 1/2	1 2/3 to 2 1/2 + 1 1/2 to 2
Clay loam	1 1/4 to 2 + 1 1/2 to 2	2 to 3 + 2 to 2 1/2

Replanting: Soybeans or field corn may be replanted within 4 months; after 4 months, any crop may be planted.

LINURON + "Ramrod" (Seed Crop Only)

Soil Texture	Product Per Acre: Low Organic Matter (1 to 3%) LINURON (pts.) + "Ramrod" 65 (Lbs.)	Product Per Acre: Moderate Organic Matter (3 to 6%) LINURON (pts.) + "Ramrod" 65 (Lbs.)
Sandy loam	2/3 to 1 1/3 + 1 to 2	1 1/3 to 2 + 2 to 3
Silt loam	1 to 1 2/3 + 1 1/2 to 2 1/2	1 2/3 to 2 1/2 + 2 1/2 to 4
Clay loam	1 1/4 to 2 + 2 to 3	2 to 3 + 3 to 4 3/4

Note: Do not graze or feed forage from treated areas to livestock; do not use seed for food, feed, or oil purposes.

Replanting: Soybeans, sorghum, or field corn may be replanted within 4 months; after 4 months, any crop may be planted.

Directed Post-emergence Application: Apply LINURON alone or as a tank mixture with 2,4-DB, as a directed spray to cover weed foliage with minimum contact of the soybean plant. Do not spray higher than 3" on the soybean stem or crop injury may result. Do not spray over top of soybean plants. For broadcast application, use a single flat-type spray nozzle ("K" series or equivalent) per middle mounted on an oiling shoe or gauge wheel. For band treatment, use two nozzles per row mounted on oiling shoes or gauge wheels, one on each side of row. To avoid spray drift, which may cause crop injury, do not exceed nozzle pressure of 35 psi nor use nozzle tips smaller than 8002 Flat (or equivalent) and do not spray under windy conditions. For best results, use a pre-emergence treatment (such as

LINURON or cultivation to control ly we. rowth and to increase the differential betwee eight o: soybeans and weeds.

Note: Do not use on soils with less than ½% organic matter. Do not apply within 60 days of harvest. Do not feed soybean forage or hay to livestock from fields treated post-emergence. Harvested soybeans may be used for food, feed, or oil purposes.

GRIFFIN LINURON — Midsouth and Southeast: Apply when soybeans are at least 12" tall and when weeds do not exceed 4" in height. In Midsouth, application may be made when soybeans are at least 8" tall and weeds do not exceed 2" in height. Make a single application of 1 to 2 pts. per acre (½ to 1 pt per acre on 8" soybeans); add 1 pt. Surfactant for each 25 gals. spray mixture. Alternatively, if application is made to 12" soybeans, make a split application of 1 pt. per acre followed by a second application at same rate after one week or later. Do not apply more than 2 pts per acre per season for post-emergence treatment.

GRIFFIN LINURON + 2,4-DB — U.S.: Apply 1 pt. GRIFFIN LINURON plus 1/5 lb. 2,4-DB (1 pt. "Butyrac"** 175 or 13 fl. oz. "Butyrac"200) per acre when soybeans are at least 8" tall and when weeds do not exceed 4" in height. Add 1 pt. Surfactant for each 25 gals. spray mixture. A second application may be made if needed, but do not make more than 2 applications per season.

WHEAT (WINTER) (Drill-Planted) — Idaho, Oregon, Washington: Plant seed at least 1" deep; when seed is planted during abnormally dry weather, treat after soil has been settled by rainfall or irrigation. Apply as a broadcast spray prior to emergence of wheat or to semi-dormant wheat plants. Application to actively growing plants may result in temporary yellowing (chlorosis) of wheat.

Crop injury may result where severe winter stress, disease or insect damage follows application, and also from failure to observe the following: Do not use on sand or loamy sand soils, nor on gravelly or sandy loams low in organic matter (less than 1%), nor on thinly covered or exposed sub-soil areas (clay knobs); do not treat wheat planted less than 1" deep; do not treat wheat where winter climatic conditions have caused "heaving" of plants; do not treat wheat plants lacking in vigor due to poor emergence, insect damage, disease, high alkalinity or other causes; do not apply after wheat has reached the "boot" stage of maturity nor when maximum daily temperature exceeds 60°F.; do not use GRIFFIN LINURON in combination with other pesticides (except as noted), surfactants, or nitrogen solution after wheat has emerged.

Do not graze or feed immature plants to livestock. Do not replant treated areas to any rotation crop within 6 months after last application injury to subsequent crops may result.

West of Cascade Range: Make a single application of 2 to 3½ pts per acre as soon as possible after planting. If wheat and weeds have emerged, apply before weeds are 3" to 4" tall.

East of Cascade Range: Make a single application of GRIFFIN LINURON alone or, where recommended below, as a tank mixture with bromoxynil. If fall-planted wheat fails to grow due to winter kill or adverse growing conditions after fall treatment, allow 4 months before planting spring wheat. Do not re-treat field with a second application during the same crop year as injury to the crop may result.

Where Average Annual Rainfall Exceeds 16 Inches:

Fall Treatment: For early fall-planted wheat (seeded before September 10), apply 1 to 1½ pts. GRIFFIN LINURON per acre either before or after wheat has emerged but before weeds are 2" tall. Treatment after October 1 generally gives best results. Do not apply after soil freezes in the fall.

Spring Treatment: Apply 1 to 1¼ pts. GRIFFIN LINURON per acre as soon as wheat starts to grow in the spring. Application after weeds have reached a height of 2" may give poor results.

Where Average Annual Rainfall Is 10 to 16 Inches:

Fall or Winter Treatment: After wheat is planted in the fall, apply 1 to 1½ pts. GRIFFIN LINURON per acre when sufficient moisture is available to germinate wheat seed. Apply either before or after wheat has emerged, but before weeds are 2" tall and before the soil freezes. Application later than March 1 may give poor results.

Where Average Annual Rainfall Is 10 to 20 Inches:

Fall or Spring Treatment: Apply ½ pt GRIFFIN LINURON plus ¼ lb. bromoxynil per acre as a tank mixture, either in the fall after wheat has emerged but before soil freezes or in the spring as soon as soil thaws; apply before weeds are 2" tall or across.

NON-CROP WEED CONTROL

For short-term control of annual weeds on non-cropland areas such as roadsides and fence rows — apply 2 to 6 pts GRIFFIN LINURON per acre in 40 to 100 gals. of water. For best results, apply shortly before weed growth begins or at early seedling stage of growth. For control of established annual weeds, add Surfactant at rate of 2 qts. per 100 gals. of spray mixture and apply as a thorough coverage spray during periods when daily temperatures exceed 70°F. and before weed growth exceeds 8" in height.

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